

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



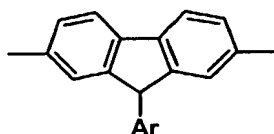
(43) International Publication Date  
21 May 2004 (21.05.2004)

PCT

(10) International Publication Number  
**WO 2004/041902 A3**

- (51) International Patent Classification<sup>7</sup>: **C08G 61/02**,  
C09K 11/06, H01L 51/00
- (21) International Application Number:  
PCT/GB2003/004753
- (22) International Filing Date:  
4 November 2003 (04.11.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
0225869.7 6 November 2002 (06.11.2002) GB
- (71) Applicant (for all designated States except US): **CAMBRIDGE DISPLAY TECHNOLOGY LIMITED** [GB/GB]; c/o IP Department, Greenwich House, Madingley Rise, Madingley Road, Cambridge, Cambridgeshire CB3 0TX (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BURROUGHES, Jeremy** [GB/GB]; c/o Cambridge Display Technology Limited, Greenwich House, Madingley Rise, Madingley Road, Cambridge, Cambridgeshire CB3 0TX (GB). **FRIEND, Richard** [GB/GB]; c/o Cambridge Display Technology Limited, Greenwich House, Madingley Rise, Madingley Road, Cambridge, Cambridgeshire CB3 0TX (GB). **FODEN, Clare** [GB/GB]; c/o Cambridge Display Technology Limited, Greenwich House, Madingley Rise, Madingley Road, Cambridge, Cambridgeshire CB3 0TX (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**  
— with international search report  
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- (88) Date of publication of the international search report:  
12 August 2004
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: 9-ARYL AND BISAYL SUBSTITUTED POLYFLUORENES



(I)

(57) Abstract: A polymer comprising optionally substituted first repeat units of formula (I): wherein Ar is selected from: (a) aromatic hydrocarbon substituted with at least one electron withdrawing group or (b) electron withdrawing heteroaryl. The polymers have application in electroluminescent devices.

WO 2004/041902 A3

# INTERNATIONAL SEARCH REPORT

Intern: I Application No  
PCT/GB 03/04753

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C08G61/02 C09K11/06 H01L51/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08G C09K H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, CHEM ABS Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 01/62822 A (TOWNS CARL ROBERT ;GRAND VALERIE (GB); DELL RICHARD O (GB); CAMBRI) 30 August 2001 (2001-08-30) page 5 - page 6 page 11 - page 14; example 1	1,3-14, 16-18
Y	US 5 807 974 A (KIM CHUNG YUP ET AL) 15 September 1998 (1998-09-15) column 4, line 53 - column 5, line 7; examples 4,5	1,3-14, 16-18

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "G" document member of the same patent family

Date of the actual completion of the international search

27 February 2004

Date of mailing of the international search report

24.06.04

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Marsitzky, D

# INTERNATIONAL SEARCH REPORT

In international application No.  
PCT/GB 03/04753

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely: .
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1, 3-13, 15-18

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 3-13, 15-18

9-Monoaryl substituted Polyfluorene homopolymers and copolymers, the monomers, a process for their production and their use in OLEDs.

---

2. claims: 2, 14

9-Bisaryl-substituted Polyfluorene homo- and copolymers, the monomers and a process for their production as well as their use in OLEDs

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern Application No

PCT/GB 03/04753

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0162822	A	30-08-2001	AU 3577301 A	03-09-2001
			EP 1263834 A1	11-12-2002
			WO 0162822 A1	30-08-2001
			JP 2004500463 T	08-01-2004
			US 2003153725 A1	14-08-2003
			AU 2690001 A	16-07-2001
			AU 3177700 A	04-10-2000
			AU 3577801 A	03-09-2001
			AU 3761801 A	17-09-2001
			CA 2367388 A1	21-09-2000
			CN 1404521 T	19-03-2003
			EP 1169741 A1	09-01-2002
			EP 1244723 A2	02-10-2002
			EP 1257611 A1	20-11-2002
			EP 1263837 A1	11-12-2002
			WO 0149768 A2	12-07-2001
			WO 0162869 A1	30-08-2001
			WO 0166618 A1	13-09-2001
			JP 2002539292 T	19-11-2002
			JP 2003519266 T	17-06-2003
			JP 2004500464 T	08-01-2004
			JP 2004500468 T	08-01-2004
			US 2003186079 A1	02-10-2003
			US 2003194577 A1	16-10-2003
US 5807974	A	15-09-1998	KR 176331 B1	01-04-1999
			GB 2313127 A ,B	19-11-1997
			JP 3121282 B2	25-12-2000
			JP 10036487 A	10-02-1998